

# **Effective Secondary Prevention of Fragility Fractures:**

**Clinical Standards for Fracture Liaison Services**

# Effective Secondary Prevention of Fragility Fractures: Clinical Standards for Fracture Liaison Services

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**Audience:** Service providers, clinical commissioners and commissioning teams.



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## Foreword

Preventing fragility fractures is good for patients and makes good financial sense for the NHS. With the ageing population, the NHS faces a huge increase in fragility fractures, putting pressure on acute and community services as these injuries result in significant long-term disability. However, prompt identification and management of osteoporosis following the first fracture presents a great opportunity to reduce the risk of a second fracture. This is an opportunity we must take now.

Preventing fragility fractures requires action within community and hospital services and must involve patients, carers and specialists from many disciplines and backgrounds to provide a comprehensive Fracture Liaison Service to all older patients who have suffered their first fragility fracture. This service needs to be available to all patients in the United Kingdom and the pathway needs to be easy to enter and easy to navigate.

This document sets standards for care that professionals and patients expect. The standards address the whole pathway, from identification of the patient through to assessment of future risk and the provision of guidance, information and treatment for patients. Patients will know what to expect. Healthcare commissioners and professionals will have clear standards to work towards. These standards are an important step towards providing a comprehensive network of Fracture Liaison Services throughout the UK and will help to prevent many thousands of fractures in the future.



### **Chris Moran**

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# Summary of Clinical Standards for Fracture Liaison Services

|                       | CRITERIA   | RATIONALE   | MEASURES   | OUTCOMES  |
|-----------------------|--|---|--|---|
| <b>Identification</b> |  |   |  |   |
| 1                     | All patients aged 50 years and over with a new fragility fracture or a newly reported vertebral fracture will be systematically and proactively identified.      | Patients who have sustained a fracture are at higher relative risk of fracture than those who have not. Targeted interventions in this population will have most impact on reducing the future fracture burden. | Proportion of fragility fracture patients aged over 50 years identified by the FLS.<br><br>Denominator for all fragility fractures can be best estimated by multiplying total hip fractures in over 50 year olds by a factor of 5 <sup>(1)</sup> . | Systematic identification of the at risk patient population who would most benefit from further investigation.                              |
| <b>Investigation</b>  |  |   |  |   |
| 2                     | Patients will have a bone health assessment and their need for a comprehensive falls risk assessment will be evaluated within 3 months of the incident fracture. | Assessments need to be conducted promptly as the risk of having a further fracture is increased in the first year.  | % of identified patients who have a bone health assessment within 3 months of incident fracture.<br><br>% of identified patients who have a falls risk assessment within 3 months of incident fracture.  | Improved identification of the population who will benefit from interventions leading to appropriate targeting of resources.                |
| <b>Information</b>    |  |   |  |   |
| 3                     | All patients identified will be offered written information about bone health, lifestyle, nutrition and bone-protection treatments.                              | Anyone aged over 50 years who has had a fracture needs to be aware of the steps they can take to maintain healthy bones and prevent further fractures.  | % of identified patients given information.  | Improved patient understanding leading to confident self-management and engagement with recommended interventions.                          |
| <b>Intervention</b>   |  |   |  |   |
| 4                     | Patients at increased risk of further fracture will be offered appropriate bone-protection treatments.   | Appropriately targeted interventions reduce future risk of fracture.  | % of assessed patients offered bone-protection treatment within 3 months and 6 months of incident fracture.  | The right people receive the right interventions for bone health and falls prevention leading to reduced fracture risk and fewer fractures. |
| 5                     | Patients at increased risk of further falls will be referred for appropriate assessment or interventions to reduce future falls.                                 | Evidence-based falls interventions are effective at reducing risk of falls.   | % of assessed patients referred for falls assessment or intervention within 3 months and within 6 months.  | Patient mobility and independence is maintained.  |

|    | CRITERIA  | RATIONALE   | MEASURES  | OUTCOMES  |
|----|---|---|---|---|
|    | <b>Integration</b>  |   |   |   |
| 6  | Management plans will be patient-centred and integrated between primary and secondary care.   | Effective communication is essential to ensure that long-term management is achieved and that patients are supported to engage with recommended interventions.  | Measure of communication including % of patients copied in to FLS letters.  | Patient feels supported.<br><br>Issues with treatment compliance and adherence are identified promptly. |
| 7  | Patients who are recommended drug therapy to reduce risk of fracture will be reviewed within 4 months of initiation to ensure appropriate treatment has been started, and every 12 months to monitor adherence with the treatment plan. | Treatments must be taken consistently and appropriately over many years to be effective. Follow-up allows early identification of issues (side effects, compliance) with prescribed medications, reinforces need to take treatments and supports long-term concordance. | % of patients recommended drug therapy who have initiated treatment by 4 months following fracture.<br><br>% of patients on treatment who have been reviewed within the last 12 months. | Adherence to treatments is improved leading to greater patient benefit.                                 |
|    | <b>Quality</b>  |   |   |   |
| 8  | Core clinical data from patients identified by the FLS will be recorded on a database. Regular audit and patient experience measures will be performed and the FLS will participate in any national audits undertaken.                  | Data recorded will allow the FLS to audit and improve the service they provide ensuring that high standards are met and maintained. Initial data will provide a baseline from which improvements can be assessed.   | Date of last audit against FLS standards.<br><br>Date of last patient satisfaction survey.  |   |
| 9  | The FLS team will have appropriate competencies in secondary fracture prevention and will maintain relevant Continued Professional Development (CPD).   | All staff need appropriate knowledge, skills and experience to fulfil their role. Engagement with relevant CPD activities ensures that these are up to date.  | Review of competencies and training needs in annual appraisals.<br><br>Assessment of CPD attained.  | Excellent quality of care is provided and best practice is shared.                                      |
| 10 | The FLS should engage in a regular peer-review process of quality assurance.  | Clinical peer review facilitates quality standard assurance, equitable access to services, and provides a means of benchmarking and sharing best practice.  | Date of last peer review and progress against an agreed action plan.  |   |

# Executive summary

## Key points

- The hospital costs of hip fractures alone are estimated at £1.9 billion per year in the UK <sup>[a]</sup>
- After a first fracture the risk of fracturing again is increased 2-3 fold <sup>(2,3)</sup>
- FLS is the most effective way to target interventions <sup>(4,5,6)</sup> that reduce subsequent fracture risk by up to 50% in people with fragility fractures <sup>(7, 8, 9, 10, 11, 12, 13, 14, 15, 16)</sup>

## Osteoporosis - The problem

Osteoporosis is the fragile bone disease that can lead to fragility fractures, the consequences of which are significant. Fragility fractures are:

- **Common:** 1 in 2 women and 1 in 5 men break a bone after the age of 50<sup>(17)</sup>.
- **Costly to the NHS:** Every year hip fractures alone account for 85,000 unplanned admissions, 1.8 million bed-days and approximately £1.9 billion in hospital costs, excluding the high cost of social care <sup>[a] [b] [d]</sup>.
- **Life-changing to the individual:** The impact of fractures can lead to loss of mobility and independence, social isolation and depression.

Added to this, people who have had one fracture remain at greater risk of sustaining another (i.e. a secondary fracture). Without action to reduce fracture risk, projections show that by 2036 there could be as many as 140,000 hospital admissions for hip fracture per year in the UK<sup>(18)</sup> – an increase of 65% from 2012-13 admissions <sup>[c]</sup>.



## FLS - The Solution

A Fracture Liaison Service (FLS) systematically identifies, treats and refers to appropriate services all eligible patients aged over 50 years within a local population who have suffered a fragility fracture, with the aim of reducing their risk of subsequent fractures.

As 50% of people who experience hip fracture have broken a bone in the past, FLS represents an ideal opportunity for intervention in the journey to avert that hip fracture<sup>(19,20,21,22)</sup>. Risk of further fracture in patients can then be minimised through appropriate use of medical treatments, supplements and simple changes to lifestyle to improve bone health. Risk of falls, which can lead to fracture, can also be reduced through use of evidence-based interventions.

In the UK, all relevant professional organisations<sup>(23)</sup>, the National Osteoporosis Society<sup>(18)</sup> and policymakers<sup>(24,25)</sup> have recognised the need for universal access to FLSs. Despite this, only 42% of health economies in the UK offer any form of FLS, leaving thousands of people with suboptimal care and at risk of secondary fractures<sup>(26,27)</sup>. Furthermore, the full scope and function of an FLS has never been defined, resulting in a wide variance in clinical practice among the FLSs that are in place.

This document therefore defines an FLS. It provides the core standards that every FLS should meet to ensure that correct **identification, investigation, information, intervention** and **integration** with primary care are achieved, within a framework of **quality**, to the long-term benefit of fracture patients – the 5IQ approach.

By adopting these standards, evidence-based best practice can be replicated effectively across the UK to reduce the burden of fractures while improving outcomes for patients and ensuring appropriate use of NHS resources.

# Introduction

| Fracture          | Age range (years) over 1-year period |            |            |            |            | Total       | Cost per case (£) | Total (£)        |
|-------------------|--------------------------------------|------------|------------|------------|------------|-------------|-------------------|------------------|
|                   | 45-59                                | 60-69      | 70-79      | 80-89      | 90+        |             |                   |                  |
| <b>Hip</b>        | 12                                   | 22         | 90         | 173        | 77         | 373         | 10,760            | 4,013,480        |
| <b>Forearm</b>    | 98                                   | 86         | 93         | 37         | 6          | 318         | 527               | 167,586          |
| <b>Humerus</b>    | 23                                   | 21         | 27         | 10         | 3          | 83          | 1112              | 92,296           |
| <b>Lower limb</b> | 67                                   | 50         | 33         | 14         | 4          | 167         | 3864              | 645,288          |
| <b>Pelvis</b>     | 2                                    | 2          | 9          | 17         | 7          | 35          | 9236              | 323,260          |
| <b>Spine</b>      | 3                                    | 3          | 9          | 6          | 3          | 23          | 1706              | 39,238           |
| <b>Other</b>      | 92                                   | 60         | 48         | 18         | 2          | 219         | 147               | 32,120           |
| <b>Total</b>      | <b>297</b>                           | <b>244</b> | <b>309</b> | <b>275</b> | <b>102</b> | <b>1218</b> |                   | <b>5,313,268</b> |

N.B. The above values have been calculated by applying fracture hospitalisation and outpatient cost estimates for the UK published in 2006 to fracture incidence data reported by the Ipswich Fracture Liaison Service. The cost for the 219 'other' fractures was set conservatively at the value for ribs and sternum fractures in Stevenson et al<sup>(30)</sup>. Adapted with kind permission from Clunie G and Stevenson S<sup>(31)</sup> and Department of Health<sup>(32)</sup>.

Table 1. Estimate of the annual economic burden of fragility fractures for a population of 320,000.

## Fragility fractures and their impact

Osteoporosis is the most common chronic bone disease affecting both women and men<sup>(28)</sup>.

The clinical manifestation of this disease is fragility fractures. These are bone fractures that result from mechanical forces that would not normally result in fracture (i.e. low-trauma fractures), and occur due to low bone density and structural deterioration of bone tissue. The World Health Organization (WHO) has quantified this as forces equivalent to a fall from a standing height or less. Fragility fractures due to osteoporosis most commonly occur in the spine, hip and wrist but may also affect the humerus, pelvis, ribs and other bones.

One in two women and one in five men will break a bone after the age of 50 years<sup>(17)</sup>. An estimated 300,000 fragility fractures occur in the UK every year<sup>(23)</sup>. Each year, hip fracture alone account for nearly 85,000 hospital fractures and over 1.8 million hospital bed-days in the UK<sup>[b][d]</sup>.

The number of emergency admissions due to falls and fractures results in more bed-days than from heart attack, heart failure and stroke combined<sup>(28)</sup>.

As described in the Department of Health Prevention Package for Older People<sup>(29)</sup>, hip fracture accounts for the majority of hospital and outpatient costs related to all osteoporotic fractures. The hospital costs of hip fractures alone are estimated at £1.9 billion, excluding the high cost of social care.

Table 1 shows the estimated economic burden of fragility fractures on an English healthcare locality serving a population of 320,000. As expected, hip fracture costs are the greatest. However, the costs of non-hip fragility fractures are also significant, approaching £1.3 million for the average hospital locality. At a national level, this translates to a cost in excess of £200 million per year.

The National Hip Fracture Database (NHFD) has been auditing hip fractures in England, Wales and Northern Ireland since 2007. As the UK population has aged, the last two decades have borne witness to a significant increase in the incidence of hip fractures. In the mid-1980s, 46,000 hip fractures occurred annually in the UK<sup>(33)</sup>, compared with 85,000 in 2012-13<sup>(b)</sup>. Without action to reduce fracture risk, projections show that by 2036 there could be as many as 140,000 hospital admissions for hip fracture per year in the UK<sup>(18)</sup> – an increase of 65% from 2012-13 admissions<sup>(c)</sup>. While projections are not available, other types of fracture will also increase.

As well as the significant burden on health and social care resources, the impact of fractures on individuals can be devastating, leading to loss of independence, mobility and capacity to carry out everyday tasks. In a survey conducted by the National Osteoporosis Society of over 3,000 people living with osteoporosis, 42% felt socially isolated by their osteoporosis, 1 in 3 reported difficulty with domestic chores and over 40% of those who had fractured said they were in long-term pain they did not think would ever go away<sup>(34)</sup>.

Vertebral fractures can change a person's body shape, which in turn may affect the function of internal organs and reduce mental wellbeing; a third of people with spinal fractures in the Life With Osteoporosis survey reported experiencing breathlessness and digestive difficulties<sup>(34)</sup>. Forty per cent of people with diagnosed vertebral fractures will live with constant pain and have difficulty with everyday activities<sup>(34,35,36)</sup>. Vertebral fractures are also associated with excess mortality, which rises with the number of vertebral fractures<sup>(37,38)</sup>.

A month after experiencing a hip fracture, 8% will have died and only half will have returned home<sup>(39)</sup>. Of those who survive, 60% have difficulty with activities such as feeding, dressing and going to the toilet, 80% are unable to shop, garden or climb stairs, and 15–25% enter long-term residential care<sup>(40,41)</sup>. During the first year after hip fracture, half of people who walked unaided prior to their fracture will no longer be able to walk independently<sup>(42)</sup>.

People who have had one fracture remain at a two- to three-fold greater risk of sustaining another (i.e. a secondary fracture)<sup>(17)</sup> and 23% of secondary fractures occur within 1 year of the first event<sup>(43)</sup>.

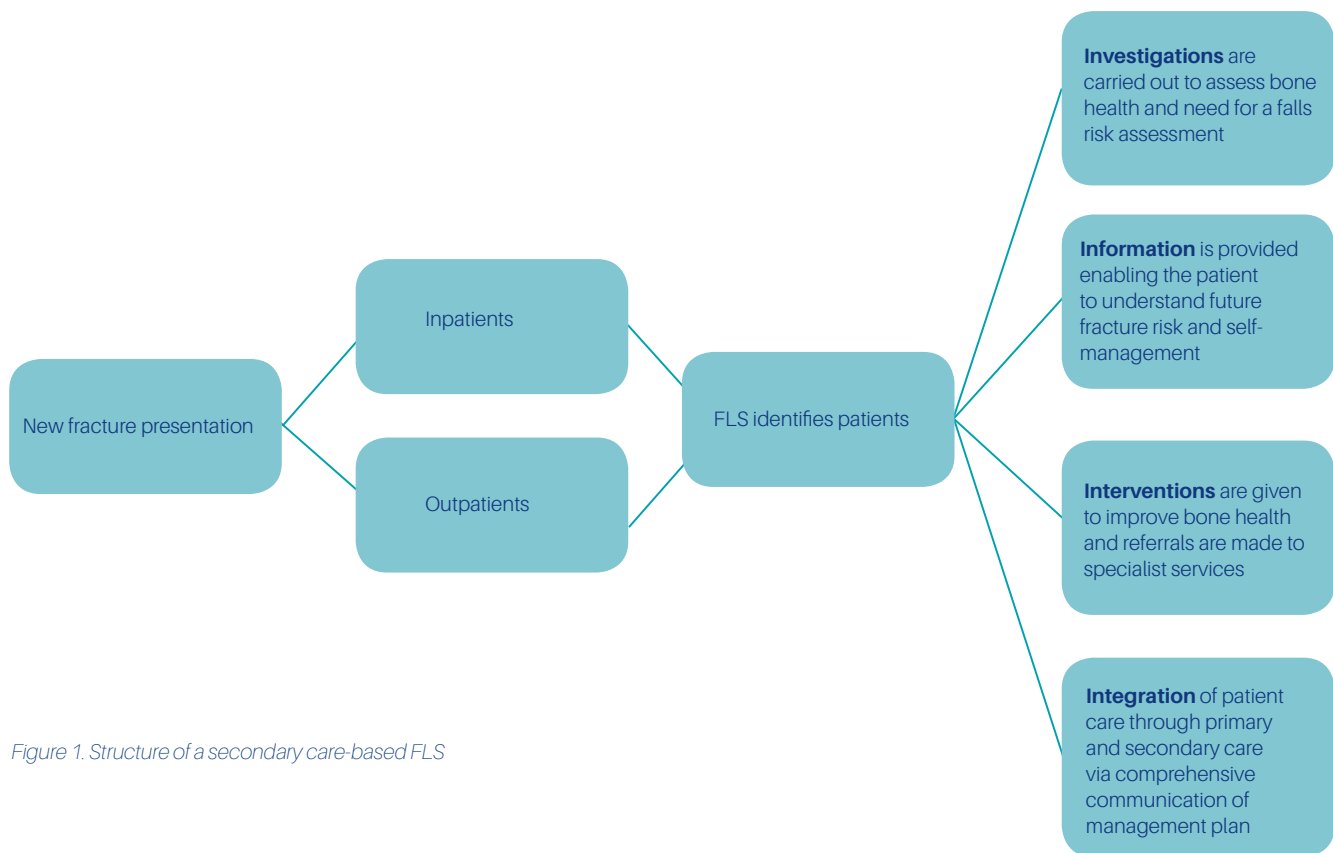


Figure 1. Structure of a secondary care-based FLS

### Solution: systematic fracture prevention through a Fracture Liaison Service (FLS)

Fracture risk in a person with osteoporosis can be minimised through appropriate use of medical treatments and simple changes to lifestyle to improve bone health. Risk of falls, which can lead to fracture, can also be reduced through use of evidence-based interventions.

Currently, 50% of people who experience hip fracture have broken a bone in the past<sup>(19,20,21,22)</sup>. Thus, we are presented with an opportunity to intervene in their journey towards (with a view to averting) that hip fracture. By identifying these patients in a consistent, systematic way, an estimated 25% of hip fractures (approximately 20,000 a year in the UK) could be prevented<sup>(44)</sup>.

A Fracture Liaison Service systematically identifies, treats and refers to appropriate services all eligible patients aged over 50 years within a local population who have suffered a fragility fracture, with the aim of reducing their risk of subsequent fractures (Figure 1).

Evaluation of established FLSs has demonstrated this model leads to effective case identification, investigation and intervention to minimise future fracture risk through bone protection and referral into falls prevention pathways. For example, from 2000 to 2010, the Glasgow FLS (the first FLS in the world) assessed more than 50,000 consecutive fracture patients. During this period, hip fracture rates in Glasgow reduced by 7.3% versus an almost 17% increase in England<sup>(45)</sup>. Ninety-five per cent of people with a wrist fracture were

assessed and/or treated, compared to 20–25% in centres operating other methods of secondary fracture prevention<sup>(46)</sup>. In May 2011, a formal cost-effectiveness analysis of the Glasgow FLS was published. This study concluded that 18 fractures were prevented, including 11 hip fractures, and £21,000 was saved per 1,000 patients that were managed through the FLS<sup>(47)</sup>. Given that 300,000 patients present to UK hospitals with fragility fractures every year, this equates to potential savings of £6.3 million per year if FLSs were universally available. Economic analyses from the Department of Health in the UK<sup>(48)</sup> and Kaiser Permanente<sup>(49)</sup> in the United States report similar findings. Furthermore, modelling of an FLS model in Toronto, Canada, concluded that cost-savings would be achieved within the first year of operation<sup>(50)</sup>.

In the UK, relevant professional organisations<sup>(23)</sup>, the National Osteoporosis Society<sup>(51)</sup> and policymakers<sup>(29,48)</sup> have recognised the need for universal access to FLSs. This consensus is also being reflected in a growing body of professional organisations, patient societies and policymakers throughout the world, leading to widespread global adoption of the UK-conceived model.

However, despite demonstrable effectiveness and support for the model only 42% of health economies in the UK offer any form of FLS, leaving thousands of patients with suboptimal care and at risk of secondary fracture<sup>(26,27)</sup>. Furthermore, the full scope and function of an FLS have never been defined, resulting in a wide variance in clinical practice among the FLSs that are in place.

This document defines an FLS and provides the core standards that every FLS should meet to ensure that correct identification, investigation, information, intervention and integration with primary care are achieved, within a framework of quality, to the long-term benefit of fracture patients – the 5IQ approach.

By adopting these standards, evidence-based best practice can be replicated effectively across the UK to reduce the burden of fractures while improving outcomes for patients and ensuring appropriate use of NHS resources.

# Secondary fracture prevention and FLS

## Why focus on secondary fracture prevention?

Intervention to reduce future fracture risk in patients who have already broken a bone takes priority over primary fracture prevention (i.e. interventions in people with no prior fracture) for three reasons:

1. Patients who have sustained a fracture at any site are at 2- to 3-fold greater risk of fracture (at any skeletal site), compared with their peers who have not sustained a fracture (other risk factors being equal)<sup>(2,3)</sup>
2. Fifty per cent of hip fractures occur in patients who have previously sustained a fracture<sup>(19,20,21,22)</sup>
3. To achieve the same reduction in fracture incidence through primary prevention would necessitate identification and assessment of 5–6 times more patients<sup>(52, 53)</sup>

A secondary fracture prevention strategy will achieve substantially greater fracture risk reduction for any investment of resources than can be achieved through primary fracture prevention.

Within the fracture cohort, those with a new fracture are at even greater risk of further fracture than those with a prior fracture, and often in a short timeframe – hence those with new fractures should be afforded the highest priority in secondary prevention overall<sup>(43)</sup>. It should nevertheless be appreciated that the legacy of enhanced fracture risk persists for many years after the occurrence of fracture – so those with prior fracture will still benefit from intervention aimed at reducing fracture risk even if the intervention is provided several years after the fracture<sup>(54)</sup>.

FLSs evolved in response to failure of ‘usual care’ to deliver secondary fracture prevention. They address the ‘care-gap’ that most patients experience after low-trauma fracture; dissociation of acute fracture care from steps to reduce future fracture risk is common. The resulting failure to investigate underlying causes of the fracture remains the most common outcome after low-trauma fracture and a neglected opportunity that leads to an avoidable burden of secondary fractures where an FLS is not in place.

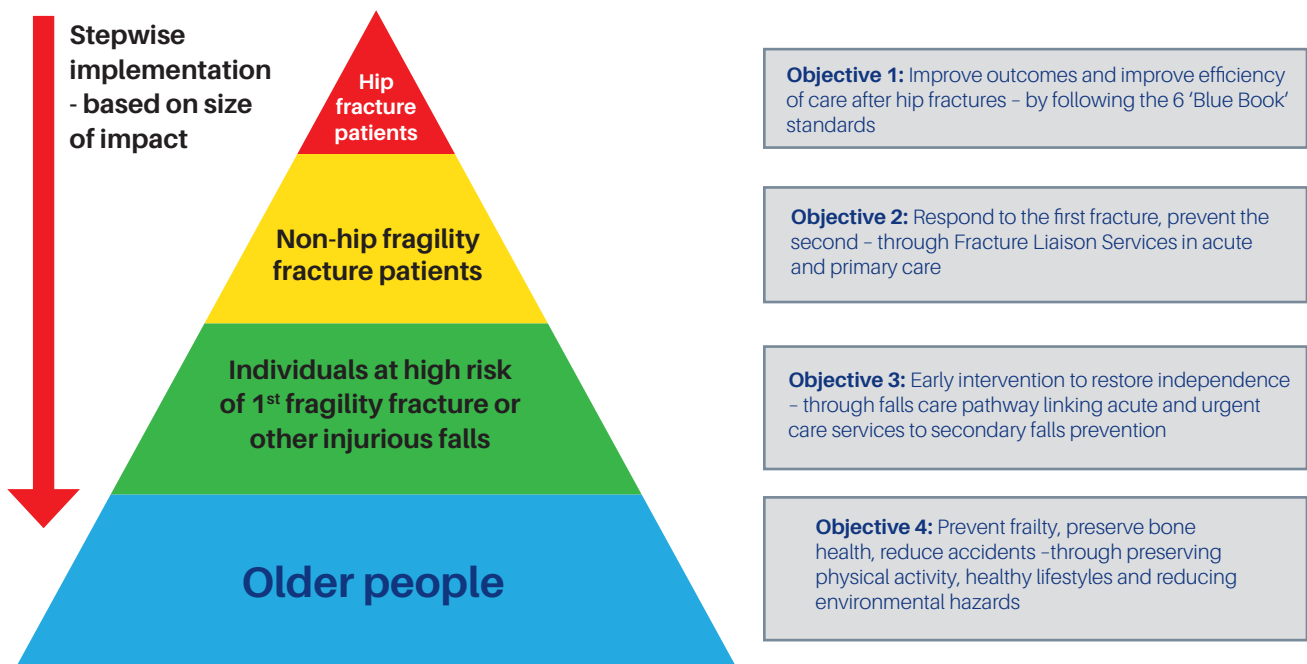


Figure 2. A systematic approach to hip fracture care and prevention<sup>(29)</sup>

## Secondary fracture prevention and UK policy

Policy and guidance published in the UK have continually highlighted the need for prioritisation of secondary fracture prevention, which is best illustrated by the Department of Health strategy summarised in Figure 2.

Establishing FLSs to the standards outlined in this document systematically implements mandatory national guidance<sup>(55,56,57)</sup> as well as addresses the following key national policy imperatives:

- Reducing emergency admissions / unplanned care
- Improving recovery from fragility fractures<sup>(58,59)</sup>
- Reducing premature death from fragility fracture<sup>(59)</sup>
- Managing long-term conditions
- Reducing hip fractures<sup>(60)</sup>
- Care of vulnerable older people

Financial incentives are in place to remunerate secondary fracture prevention in secondary care through the Best Practice Tariff for Hip Fractures (England only)<sup>(61)</sup> and in primary care through the Quality and Outcomes Framework (UK wide)<sup>(62)</sup>.

Through the QOF, GPs are asked to keep a register of patients aged over 50 years with a fracture to ensure appropriate assessment, diagnosis and treatment. While these incentives have been a positive step, alone they have not been sufficient to ensure comprehensive secondary fracture prevention, and uptake in the first two years has been disappointing<sup>(63,64)</sup>.

## 5IQ – the smart way to achieve fracture prevention



Figure 3. The 5IQ approach – the key objectives for an FLS

The 5IQ approach describes the key objectives of an FLS:

**Identify** – finding patients with new, low-trauma fractures (at the time of fracture) who will benefit from investigation and, depending on outcome, possibly subsequent intervention; with the potential to extend scope to include identification of patients with prior fractures

**Investigate** – incorporating fracture risk assessment with dual-energy X-ray absorptiometry (DXA) to determine modifiable risk that merits intervention, tests to identify underlying causes of secondary osteoporosis, and assessment of falls risk

**Inform** – educating patients managed through the FLS about their falls and fracture risk and the benefits and risks of treatment

**Intervene** – implementing the necessary package of care, including drug treatments and non-pharmacological options for sustaining a reduction in secondary fracture risk and falls

**Integrate** – sharing patient-specific management plans with primary care clinicians and with other professionals involved in the patient’s ongoing care plan, and ensuring long-term treatment concordance among patients

**Quality** – optimising the delivery and organisation of the Service through data collection and audit, continuing professional development (CPD), peer review and benchmarking.

These action points will be discussed in detail in the following pages.



## Identify

Patients with a fragility fracture first need to be identified by the FLS to ensure they undergo investigation to assess their need for intervention. Deploying a range of case finding strategies will yield the best results.

**STANDARD 1: All patients aged 50 years and over with a new fragility fracture or a newly reported vertebral fracture will be systematically and proactively identified.**

Identification of patients with a new clinical fracture is a fundamental responsibility of an FLS. This is undertaken by the 'FLS Co-ordinator' who is typically a Nurse Specialist dedicated to this role, although in some settings this role is undertaken by Allied Health Professionals or non-clinical personnel. Liaison with the local Orthopaedics and Trauma teams is essential in order to agree roles and responsibilities (e.g. to confirm that identification of patients is the responsibility of the FLS) and to agree open access to patients – an issue that cannot be taken for granted in many healthcare systems.

FLSs should include all patients aged 50 years and over who have sustained new fractures at any skeletal site, though an exception is justified for fractures of skull, facial, digit and scaphoid bones that are typically traumatic in aetiology. A pragmatic approach to the definition of a fragility fracture is encouraged and exclusions are only made in the case of a road traffic collision or a fall from above standing height.

An FLS should aim to assess all patients with new clinical and/or radiological fragility fracture presentation at any skeletal site, including the following patient groups:

**Group 1:** Managed as inpatients on acute Orthopaedic / Trauma wards.

**Group 2:** Managed as inpatients on General Medical / Elderly Care wards not requiring surgical fixation (e.g. pelvic, upper limb, acute spine fracture presentations).

**Group 3:** Presenting acutely and not requiring hospital admission but managed as outpatients via Orthopaedic / Emergency Medicine fracture clinics.

**Group 4:** Presenting acutely but not requiring hospital admission or fracture clinic follow-up.

**Group 5:** New spine fractures identified on radiology reports (incidental or anticipated).

**Group 6:** New fractures as a result of a fall during hospitalisation for other reasons.

Groups 1 and 2, i.e. patients who are hospitalised after fracture (e.g. hip fractures), are not only at highest future fracture risk<sup>(65,66)</sup>, but also are among the most straightforward to identify.

Group 3, who are managed in fracture clinics, are the next most readily recognisable group.

Groups 4 and 5 are the most challenging to capture; close liaison with radiology and A&E department records and IT systems is warranted to ensure their inclusion. While vertebral fractures are the most common osteoporosis-associated fractures, they account for ~4% of clinical fracture presentations (Figure 4) as around 50% are painless; others may be ascribed to worsening of 'usual' mechanical back pain. They are however regularly identified on plain X-rays, CT and MRI scans. Therein is an opportunity for an FLS to link with Radiology reporting systems to identify these (of which some may be new, others

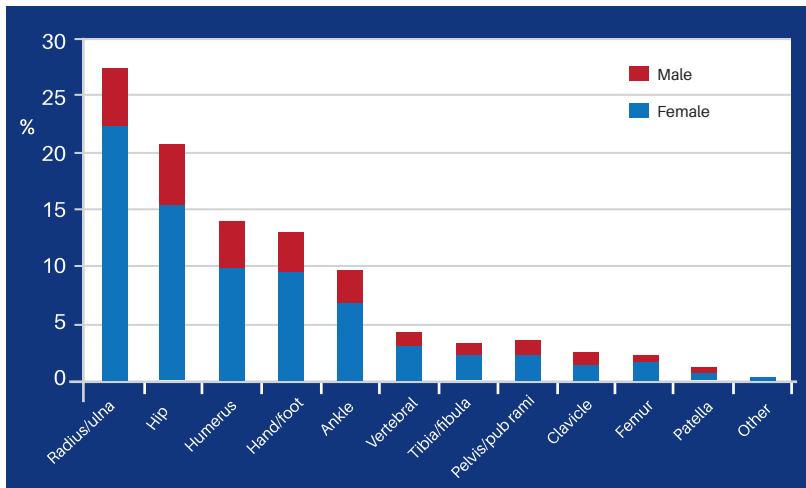


Figure 4. Sites of presenting fracture as a percentage of all acute fracture presentations. Data were obtained from an audit of the first 10 years of the North Glasgow FLS and record 30622 fractures in 26365 patients<sup>(67)</sup>.

identified serendipitously). It is also important to liaise with Skeletal Radiologists to agree the use of the term 'fracture' in reports when a vertebral fracture is present, as currently there is a range of terminology used that may not necessarily feature the word 'fracture'. This will help to facilitate patient identification. An additional opportunity to identify vertebral fractures arises from incorporating vertebral assessment routinely into DXA scans (i.e. vertebral fracture assessment [VFA], instant vertebral assessment [IVA], and vertebral morphometry). Further details of this approach are discussed under 'Investigations'.

Group 6 are only readily captured if transfer to an Orthopaedic/Trauma ward is required for management of the fracture. Options to capture all others, therefore are through liaison with the consulting Orthopaedic team, hospital falls practitioners and IT incident reporting systems. Use of Link nurses is also helpful in identifying these cases.

Identification of new clinical fracture presentations is achieved most easily by an FLS based in secondary care, typically aligned to acute fracture care. In addition to using hospital IT systems, the FLS Co-ordinator can facilitate the identification of patients with new fractures through engagement in Orthopaedic ward meetings, ward rounds and attending fracture clinics; both approaches afford the opportunity to meet patients personally to

educate, persuade and invite them to attend for further investigation. Patients are more likely to respond to direct personal invitation. It is, however, doubtful that any single approach will identify all patients with a new fracture and the FLS Co-ordinator may customise screening methods as per local hospital systems; it is recommended that multiple strategies are used for identification to maximise yield. Hospital-based FLSs should aim to promote awareness amongst healthcare professionals on the importance of identifying any noted fragility fracture history that has not had secondary prevention addressed.

A primary care-based FLS will rely on reporting from fracture clinics and/or radiology departments, so close liaison with local secondary care centre(s) needs to be established at the outset to enable seamless, continuous capture of all relevant cases. Primary care-based FLSs are well-placed to identify patients with prior fragility fracture history (prevalent fractures) from IT systems, whereas these will remain a challenge for secondary care centres.

As shown on Figure 4, data from the North Glasgow FLS show the usual proportions of fracture type ascertained by a hospital-based FLS.

|          |           | Radius / ulna | Hip  | Humerus | Ankle | Vertebra |
|----------|-----------|---------------|------|---------|-------|----------|
| <b>F</b> | <b>n</b>  | 4011          | 1210 | 1511    | 1308  | 406      |
|          | <b>%O</b> | 43%           | 70%  | 45%     | 26%   | 58%      |
| <b>M</b> | <b>n</b>  | 831           | 507  | 585     | 505   | 179      |
|          | <b>%O</b> | 24%           | 52%  | 36%     | 17%   | 39%      |

Table 3. Proportion of patients with fracture at site shown with T-score defined osteoporosis when assessed by DXA. Adapted from<sup>(66)</sup>

## Investigate

By carrying out appropriate investigations, interventions can be appropriately targeted to the right patients. The timing of investigations in people who have had a fracture is crucial. It should occur as soon as feasible after the fracture, the timing being largely determined by progress in post-fracture rehabilitation. In practice, this should ideally be within 6–8 weeks after fracture, but no longer than 3 months. Prompt assessment is needed as the risk of having a further fracture is high in the first year following a fracture.

**STANDARD 2: Patients will have a bone health assessment and their need for a comprehensive falls risk assessment will be evaluated within 3 months of the incident fracture.**

### Assessing fracture risk

There are two initial components to a bone health assessment: a dual X-ray absorptiometry (DXA) scan to measure bone mineral density (BMD) and evaluation of risk factors using a fracture risk assessment tool.

### DXA scans

Bone mineral density, a prior fracture and age are the most powerful contributors to future fracture risk. Bone mineral density measurement is an important part of clinical decision-making, establishes a baseline for future evaluation of treatment performance and is therefore recommended before treatment wherever feasible.

The purpose of DXA scanning is to determine who has osteoporosis, irrespective of the site of the original fracture, so these patients may be targeted with treatment to prevent secondary fractures. Depending on gender, age and fracture site, the prevalence of osteoporosis among patients presenting with fractures ranges from 17% to 70% (Table 3). Overall, ~70% of patients who present with new clinical fractures do so in the context of BMD that is either 'normal' or in the 'osteopenic' range, with only ~30% having osteoporosis.

Osteoporosis is diagnosed by measuring BMD and comparing the patient's result with that of a young adult of the same sex to give a T-score; a T-score below -2.5 indicates osteoporosis. For each standard deviation (SD) reduction in BMD, fracture risk increases 2- to 3-fold. DXA also serves as a means to quantify fracture risk that is amenable to modification through treatment and therefore remains an important aid to treatment decision-making.

Exceptions may be considered in the following instances where fracture risk reduction has been demonstrated when treatment has been targeted on the basis of fracture(s) without use of DXA:

- In the presence of two or more vertebral fractures (where other causes of multiple vertebral fractures have been excluded).
- After hip fracture.

In accordance with NICE guidance, treatment may be offered to patients over the age of 75 without a DXA scan where the responsible clinician considers it to be clinically inappropriate or unfeasible<sup>(54)</sup>.

As well as providing a BMD measurement, DXA can be used to assess for prevalent vertebral fractures. Quick and cheap to perform and with minimal X-ray exposure, VFA obviates the substantially greater costs and radiation exposure of conventional plain spine radiology and can reliably identify the presence of vertebral fractures.

### **Fracture risk assessment**

Bone density is not the only indicator for fracture risk. Age, previous history of fragility fracture and family history are risk factors for future fractures, independent of BMD. These and other key risk factors have been used to develop tools which allow assessment of fracture risk.

There are several fracture risk assessment tools, including FRAX and QFracture, which are assessed in NICE's short clinical guideline CG146 - Osteoporosis: Assessing the risk of fragility fracture, published in August 2012<sup>(67)</sup>.

As with any assessment tool or guidance, clinical judgement should always be used. Table 4, taken from CG146, summarises the risk factors included in both tools (as of April 2012).

While NICE have evaluated both risk assessment tools, they have not evaluated the linked intervention thresholds for either, therefore treatment should be individualised to the patient in question until further national guidance is available.

|   | QFracture   | FRAX           |
|---|-------------|----------------|
| Age   | 30-84 years | 40-90 years    |
| Sex   | Yes         | Yes            |
| BMI   | Yes         | Yes            |
| Weight  | Yes         | Yes            |
| Height  | Yes         | Yes            |
| Previous fracture   | No          | Yes            |
| Parental history of hip fracture                          | Yes         | Yes            |
| Smoking   | Yes         | Yes            |
| Alcohol   | Yes         | Yes            |
| Hormone replacement therapy                               | Yes         | No             |
| Menopause symptoms  | Yes         | No             |
| Endocrine disorders                                       | Yes         | No             |
| Glucocorticoid use  | Yes         | Yes            |
| Secondary osteoporosis*                                   | No          | Yes            |
| Asthma  | Yes         | No             |
| Cardiovascular disease                                    | Yes         | No             |
| History of falls  | Yes         | No             |
| GI malabsorption  | Yes         | No             |
| Chronic liver disease                                     | Yes         | No             |
| Rheumatoid arthritis                                      | Yes         | Yes            |
| Type 2 diabetes   | Yes         | No             |
| Tricyclic anti-depressants                                | Yes         | No             |
| Bone mineral density (femoral neck T-score/absolute risk) | No          | Yes (optional) |

\*e.g. from type 1 diabetes, chronic hyperthyroidism, premature menopause, chronic liver disease, chronic malnutrition, chronic liver disease

Table 4: Risk factors included in FRAX and QFracture algorithms

| Patient group            | Laboratory tests   |
|--------------------------|--|
| <b>Women and men</b>     | Erythrocyte sedimentation rate (ESR), full blood count (FBC)   |
|                          | Urea and electrolytes (U&Es), liver function tests (LFTs), thyroid function tests (TFTs), calcium, phosphate, alkaline phosphatase |
|                          | Serum 25 hydroxyvitamin D (25OHD) vitamin D (not obligatory if empirical treatment with vitamin D supplements)                     |
| <b>Men &lt; 65 years</b> | Early morning testosterone, sex hormone binding globulin (SHBG)  |

N.B. Other tests may be indicated including parathyroid hormone (PTH), detailed multiple myeloma work up, additional pituitary hormone testing (e.g. LH, FSH, prolactin). Some cases may also warrant consideration of additional pathologies such as coeliac disease or Cushing's syndrome. Protocols for investigations should never preclude additional investigations that can be tailored to the patient's specific circumstances.

Table 5. Suggested laboratory tests to use when investigating patients in need of secondary fracture prevention

## Other investigations

Patients deemed to be at increased risk of fracture should have investigations to assess for underlying secondary causes of osteoporosis/high fracture risk including exclusion of diseases that can present with osteoporosis and vertebral fracture (such as multiple myeloma or malignancies that metastasise to bone). 'Safety blood tests' such as estimated glomerular filtration rate (GFR) should also be performed to help inform treatment choices.

## Falls risk assessment

When a fragility fracture has occurred as a result of a fall, a multifactorial falls risk assessment is warranted in all older individuals<sup>(69)</sup> and may also be appropriate in younger individuals with risk factors. An FLS should engage closely with the local falls service to determine pathways to ensure early assessment and intervention post-fracture.

An initial enquiry to the FLS should take place to determine a falls history. The multifactorial assessment and targeted intervention role will lie primarily with the local falls service but depending on local arrangements, further elements of this assessment may be conducted by an FLS with relevant skills, in which case there must be clear and timely linkage to the necessary intervention pathways, as will be discussed in standard 5 on page 27.

Components of a multifactorial assessment screen will include:

- Enquiry regarding number of prior falls in the last 12 months
- Enquiry regarding possible syncope, including collateral history where indicated
- Assessment for pre-fracture gait and balance deficits
- Enquiry regarding cognitive deficit
- Enquiry regarding visual deficit
- Enquiry regarding polypharmacy/sedative medications
- Enquiry regarding urinary continence
- Enquiry regarding fear or falling

The elements of the multifactorial assessment enable identification of leading risk factors amenable to intervention, in order to reduce future falls risk<sup>(69, 74)</sup>. It is essential that the local falls service is fully engaged with the FLS to avoid duplication of assessments that are onerous for patients, and to ensure adequate training and expertise of the assessor, if this initial triage for fracture patients is to take place within the FLS.

## Inform

Patient education is an important component of an FLS. By giving patients and their carers good information in formats that meet their individual needs, interests and concerns, patients can be effectively supported to understand their condition and the importance of engaging with treatments.

**STANDARD 3: All patients identified will be offered written information about bone health, lifestyle, nutrition and bone-protection treatments.**

Giving patients a 'diagnosis' and mentioning osteoporosis can be overwhelming and patients may not absorb or understand all that is explained to them. The priorities for an FLS are to cover simple key points and back this up with information resources in appropriate formats. Important areas to cover are described below.

### Information about drug treatments and side effects

Information that explains why treatments need to be taken in a certain way will help patients to understand the reasons behind the specific instructions given. Explain that the treatment will need to be continued for a number of years to ensure benefits are achieved.

Discuss the patient information sheet that will come with the treatment, in particular the listed side effects, which might alarm patients. If patients have specific worries about adverse effects, follow up explanations with printed information, preferably explaining accurate incidence figures for them to consider. Fears about adverse effects can be significant and helping patients to get these concerns into perspective has huge potential in terms of improving adherence to treatment.

### Lifestyle

Information about lifestyle changes that patients can make to promote bone health is important to reduce fracture risk but is also very popular – it provides a positive message and allows patients to feel in control of their health. Many patients feel 'all they get is drugs' which often is not their preferred approach. Information should cover healthy eating for bone health rather than just emphasising the need for a high calcium intake. Exercise advice should be tailored to the individual and include appropriate exercises for bone health as well as any considerations they may need to be mindful of when undertaking exercise.

Information should be given about other aspects of healthy living such as not smoking, avoiding excessive alcohol and having adequate vitamin D. It may help to confirm that many of these changes also help to prevent other prevalent medical conditions such as heart disease and some cancers.

### Others services

Give information about other services you will be referring patients to (such as falls prevention, physiotherapy, pain clinics).

### Information format

Information resources that reinforce discussion with patients is important. Essential information such as can easily be missed or misunderstood. Consider highlighting or marking the important information to help patients to focus on the key points.

Some patients prefer to use online resources to explore their own areas of interest; others may not be computer users and still prefer printed publications. Don't give too many publications to patients who are reluctant to be given information or who will find reading printed resources difficult. If there are language or sight issues ensure access to appropriate information is established. Support organisations may offer audio or large print versions of resources, translated publications or a translation service via the telephone.



## **Following up**

All patients will benefit from an overview or summary of key information with access to more detailed information and support if, or when, it is needed.

If resources are available to provide group education sessions, either through peer support or led by health professionals, then both one-off and a series of sessions are beneficial. Information helplines, such as the Helpline run by the National Osteoporosis Society, can be a useful resource for patients to follow up with questions and concerns.



## Intervene

Intervention should comprise a tailored package of care that addresses the modifiable risk factors that have been identified for each patient. This may include both pharmacological and non-pharmacological interventions.

### Pharmacological treatments

The most appropriate treatment should be selected according to the patient's individual needs where modifiable fracture risk exceeds the agreed treatment threshold. There are a range of effective bone-protection treatments available and national guidance gives advice about how these should be used<sup>(55,56)</sup>. This section outlines key considerations when making treatment decisions to reduce fracture risk.

**STANDARD 4: Patients at increased risk of further fracture will be offered appropriate bone-protection treatments.**

### Treatment choice

Treatment choice should take into account an analysis of benefit versus risk and patients should be included in the decision-making process.

When treatment is deemed necessary, the chosen modality should be capable of preventing the type of fractures for which the patient is at greatest risk. According to pivotal clinical trial evidence, most of the licensed treatment options are capable of preventing vertebral fractures (Table 6)<sup>(7,8,9,10,11,12,13,14,15,16)</sup>. Certain treatments can also reduce the risk of hip and/or non-vertebral fractures.

|                     | Vertebral fracture | Non-vertebral fracture |       |
|---------------------|--------------------|------------------------|-------|
|                     |                    | Other                  | Hip   |
| <b>Oral</b>         |                    |                        |       |
| Etidronate          | Yes                |                        |       |
| Alendronate         | Yes                | Yes                    | Yes   |
| Risedronate         | Yes                | Yes                    | Yes   |
| Ibandronate         | Yes                | [Yes]                  |       |
| Raloxifene          | Yes                |                        |       |
| Oestrogen (HRT)     | Yes                | Yes                    | Yes   |
| Calcitriol          | Yes                |                        |       |
| Strontium ranelate  | Yes                | Yes                    | [Yes] |
| <b>Subcutaneous</b> |                    |                        |       |
| Teriparatide        | Yes                | Yes                    |       |
| Denosumab           | Yes                | Yes                    | Yes   |
| <b>Intravenous</b>  |                    |                        |       |
| Ibandronate         | Yes                | [Yes]                  |       |
| Zoledronate         | Yes                | Yes                    | Yes   |

Table 6: Summary of fracture risk reduction efficacy of current licensed treatments for osteoporosis in the UK. Brackets indicate data from post-hoc analysis

When bone-sparing treatment is deemed necessary, the first choice is a generic oral bisphosphonate primarily because of efficacy across the spectrum of fracture risk reduction and low cost<sup>(65)</sup>. Use of these agents requires patients to have a creatinine clearance >30 ml/min (risedronate) or >35 ml/min (alendronate). Patients must also be able to adhere to the complex advice for oral ingestion in order to maximise absorption (at best between 1% and 5% of oral bisphosphonates are absorbed) and minimise risk of oesophageal irritation. Other oral drugs are listed in Table 6, but their use is limited by potential risks/contraindications.

A number of licensed parenteral treatments are available and feature among second- and third-line options<sup>(55)(56)</sup>. These offer some potential advantages over oral treatments including no reliance on gastrointestinal absorption, no direct upper gastrointestinal side effects, reduced frequency of administration and assured adherence with therapy. Patients with complex comorbidities, cognitive impairment, multiple drug intolerances or severe fracture risk may benefit from parenteral treatment.

Further information on the use of licensed bone-protecting treatments is given in national guidance<sup>(51,52,53)</sup>.

### **Supplementary treatment**

Vitamin D and calcium are generally recommended concurrently with bone-sparing treatment. There is some evidence that combined calcium and vitamin D supplementation may also reduce fracture risk in institutionalised frail older women<sup>(70)</sup>. It is advised to enquire about dietary calcium intake. Where calcium intake is adequate, vitamin D supplementation alone can suffice<sup>(71)</sup>. Further guidance on managing vitamin D deficiency in adults with or at risk of bone disease is given by the National Osteoporosis Society<sup>(71)</sup>.

### **Onset of effect**

It is unclear how quickly treatments achieve fracture risk reduction. In clinical studies, non-vertebral fracture risk reduction has been shown within 12–18 months of drug treatment<sup>(72)</sup>. One meta-analysis suggests risk reduction may occur as early as 6 months after starting treatment<sup>(73)</sup>. However long an individual treatment takes to generate fracture risk reduction it is likely to be several months, during which time there is at least a place for non-pharmacological interventions such as falls risk-reduction strategies.

### **Duration of treatment**

Use of oral bisphosphonates is usually recommended for 5 years in the first instance and then an objective review of therapy should take place to determine whether more prolonged treatment is warranted or whether a 'drug holiday' should be considered. A reassessment of fracture risk should take place at around 5 years and a number of variables (discussed in the National Osteoporosis Guideline Group guidance<sup>(74)</sup>) considered to determine next steps in care.

While a drug holiday may be used as part of the active treatment schedule for individual patients, it is paramount that all such patients are subsequently reassessed in terms of fracture risk to determine whether active anti-fracture therapy should be reinstated.

### **Follow-up**

In order to achieve a reduction in fracture risk, good compliance with treatment needs to be maintained for several years. Initial follow-up should be carried out by the FLS within 4 months of first contact to ensure that treatment has been started and to identify any issues with compliance or side effects. This is explored further on page 31.

## Non-pharmacological interventions

### Falls prevention

Most fragility fractures occur as a result of a fall, and many of the risk factors contributing to falls are modifiable with appropriate interventions. These interventions should follow a multifactorial assessment to enable targeting of identified risk factors<sup>(75)</sup>. Though clinical trials of falls interventions have been of insufficient size or duration to demonstrate a fracture risk reduction, common sense must be adopted in promoting these proven interventions to reduce future falls risk<sup>(75,76,77)</sup>. Exercise can also reduce fear of falling and improve patient confidence<sup>(78)</sup>.

**STANDARD 5: Patients identified as being at increased risk of falls will be referred for intervention to reduce future risk of falls.**

An FLS should link closely with falls services and ensure that patients identified as at risk of falls receive appropriate interventions. Most interventions are part of a multifactorial, individualised plan following assessment in a dedicated falls service. However, a direct exercise programme and/or referrals for home hazard modification may take place in some FLS following initial triage assessment by the FLSs. This depends on local falls service arrangements and should be clarified locally.

Multifactorial interventions are tailored to the risks identified and may incorporate a combination of the following which are proven to reduce falls risk<sup>(69)</sup>:

- Strength and balance exercise programmes
- Occupational therapy-led home hazard modification
- Medication review with withdrawal of psychotropic medications
- Pacemaker for carotid sinus hypersensitivity
- First eye cataract surgery

### Exercise for falls risk reduction

Home- or group-delivered strength and balance exercise programmes (e.g. Otago) and Tai Chi are effective at reducing falls and may be delivered as a single intervention or part of a multifactorial intervention<sup>(75)</sup>. It is recommended that to reduce falls risk, the most effective exercise programmes should be of at least 50 hours total duration (roughly twice weekly for at least 6 months) including a high balance challenge<sup>(79)</sup>.

The programme should be delivered by appropriately trained professionals, be tailored to the individual's preferences and abilities, and address known barriers such as poor self-efficacy, fear of falling and stigma associated with 'falling'<sup>(69,80,81)</sup>.

The functional and social benefits of exercise should be promoted as should encouragement of adherence<sup>(69)</sup>. For those individuals unwilling or unable to engage in exercise programmes, however, other modifiable risk factors should be addressed in a comprehensive multifactorial falls risk assessment.

### Exercises to improve BMD:

Weight-bearing exercise interventions have a modest benefit on both hip and spine BMD<sup>(57)</sup> as do non-weight bearing high-force exercises, such as progressive lower-limb strength and resistance training. Combination programmes could include both weight bearing and resistance training in the osteoporotic patient.

### Home hazard modification

This Occupational Therapist-delivered intervention involves advice and education aimed at increasing confidence, as well as risk awareness and home modification<sup>(69)</sup>. This is generally part of multifactorial intervention, as above.

## Integrate

**STANDARD 6: Management plans will be patient-centred and integrated between primary and secondary care.**

All management plans should be patient-centred and all decisions regarding treatment and monitoring reached together with the patient. To achieve this, patient education into the options available to them as well as an explanation of their future fracture risk and side effects of medication will be needed (see page 23 for more on informing patients).

Once a management plan has been agreed, effective communication between the FLS and the patient's GP is essential if there is to be an impact on fracture risk reduction. While an FLS will ensure systematic identification, investigation and intervention, primary care along with community services such as pharmacists are ideally placed to support patients to manage osteoporosis in the long term. GPs have access to up-to-date and full medical histories of their patients and they are also aware of co-morbidities, relevant family histories, social issues, other medications and investigations. Through their long lasting relationships with patients, GPs and other members of the primary care team can support patients to understand the importance of ongoing engagement with steps to minimise fracture risk, including adherence with drug treatments, exercise and recommended lifestyle changes.

Good relationships between the FLS and the GP practices in the catchment area will help facilitate effective transfer of patient management plans, as will clear communications with an outline of treatment recommendations. An FLS should ensure that there is a shared understanding of respective responsibilities, in terms of prescribing and monitoring, at defined time points to optimise the chances of effective fracture prevention.

## Coding

An FLS can help support consistent high quality coding in GP records by including the appropriate codes on communications. The following two codes are all that is necessary to demonstrate a fragility fracture in an osteoporotic patient:

|                    | Read 2 | CTV3   |
|--------------------|--------|--------|
| Fragility fracture | N331N  | XaNSP% |
| Osteoporosis       | N330.% | N330.% |

For under-75s, GPs are required by QOF to record not just the above, but also the DXA result. DXA results are a particular problem as not all clinical systems can accept a quantitative DXA result that could be either positive or negative (i.e. a T-score). Ideally a report of a DXA result should contain both the relevant qualitative and the quantitative findings for at least one of the osteoporotic sites, as follows:

|   | Read 2 | CTV3  |
|---|--------|-------|
| Lumbar DXA scan result osteoporotic       | 58EM.  | XaITb |
| Femoral neck DXA scan result osteoporotic | 58EV.  | XaPE2 |
| Hip DXA scan result osteoporotic          | 58EG.  | XaITW |
| Hip DXA scan T-score                      | 58EE.  | XaITU |
| Lumbar spine DXA scan T-score             | 58EK.  | XaITZ |
| Femoral neck DXA scan T-score             | 58ES.  | XaPDy |

Prescribed agents are automatically coded by the issue of a prescription through the GP system. An exception would be long interval agents prescribed in hospital such as PTH, ibandronate, zoledronate and denosumab. Here a set of codes exists which the GP should ideally use to indicate their patient is compliant with QOF criteria and secondary prevention surrogate markers as follows:

|                         | Read 2 | CTV3  |
|-------------------------|--------|-------|
| Teriparatide therapy    | 8BP1.  | XaKb0 |
| Denosumab therapy       | 8BPW.  | Xaagz |
| Zoledronic acid therapy | 8BPY.  | Xaah1 |
| Ibandronic acid therapy | 8BPX.  | Xaah0 |

There are a number of exemption, allergy and contraindication codes for therapies that are needed to exempt patients for the purposes of QOF, but these are not considered here.

Falls assessments and interventions are important to consider in patients who have sustained a fracture following a fall. They are not included in QOF, but some suitable codes are as follows:

|   | Read 2 | CTV3  |
|---|--------|-------|
| Referral to falls service               | 8Hk1.  | XaLqJ |
| Refer for falls assessment              | 66aF.  | XaISu |
| Falls risk assessment referral          | 9Og0.  | XaJ9V |
| Multidisciplinary falls assessment done | 9Og6.  | XaJLD |
| Group exercise programme                | 8E7A.  | Xaltq |

Other codes may be required locally and can be agreed between the FLS and the GP practices within the service catchment.

## Patient concordance with interventions

Several terms are used to describe how well a patient follows their treatment plan (Table 6).

| Definitions |   |
|-------------|---|
| Compliance  | The extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen.   |
| Persistence | The duration of time from initiation to discontinuation of therapy.   |
| Adherence   | A general term encompassing both persistence and compliance. Adherence is often defined as the number of doses taken divided by the number of days for which medication was prescribed – the medication possession ratio – MPR. |
| Concordance | An agreement reached after negotiations between a patient and a healthcare professional that respects the beliefs and wishes of the patient in determining whether, when and how medicines are to be taken.                     |

Table 7. Definitions of terms associated with treatment continuation

**STANDARD 7: Patients who are recommended drug therapy to reduce risk of fracture will be reviewed within 4 months of fracture to confirm initiation of appropriate treatment; and every 12 months to monitor adherence with the treatment plan.**

Clinical trials have shown that a variety of agents can reduce the risk of fragility fractures. However, low levels of compliance and persistence in the real life setting mean that the benefits seen in clinical trials may not translate into equivalent effectiveness in daily practice. Widely quoted, Koop’s Law states, ‘Drugs don’t work in patients who don’t take them’<sup>(82)</sup>. Up to 50% of medicines prescribed for long-term conditions are not used as recommended<sup>(83)</sup>.

Lack of adherence is an issue in osteoporosis, as it reduces the effectiveness of fracture risk reduction strategies<sup>(84)</sup>. Adherence of at least 80% is required to achieve significant fracture risk reduction<sup>(85,86)</sup>. In practice, the percentage of patients persisting with bisphosphonate therapy for 1 year ranges from 17.9% to 78%<sup>(87)</sup>. The potential social and

economic implications of inadequate persistence and compliance in osteoporosis are substantial, since low compliance brings high hospitalisation rates and healthcare costs<sup>(88,89)</sup>.

Intentional non-adherence arises from lack of understanding about the expected benefits of treatment and from concerns about side effects<sup>(90)</sup>. Unintentional non-adherence occurs when patients forget to take the treatment. Another reason for non-adherence in osteoporosis is the complexity of oral bisphosphonate regimens. At least one requirement of the instructions for oral bisphosphonates is disregarded in up to 50% of patients<sup>(91)</sup>. While parenteral treatments including intravenous bisphosphonates are promoted as solutions to suboptimal adherence, compliance or persistence, these nevertheless present challenges with regard to systems to ensure attendance of patients for subsequent treatments.

Improvement of adherence requires adoption of a ‘no-blame approach’, allowing the patient to admit to non-adherence and encouraging them to express any doubts and concerns about their treatment. It should also include education to reinforce the importance of the treatment,

an assessment of correct understanding of the administration of the treatment and suggestions of how to remember to take the treatment as directed. At this time, other aspects of care can also be checked. This may include uptake of falls interventions and lifestyle advice, intake of calcium and vitamin D, and occurrence of any subsequent falls or fractures.

Regular treatment reviews are key. Attention from a healthcare professional increases adherence to therapy by 57%<sup>(92)</sup>. An initial follow-up within 4 months allows the FLS to check that recommended interventions have commenced, that treatments are taken as directed and to monitor side effects. Thereafter, compliance with treatment should be checked annually. In practice, this may be best carried out in primary care via a GP, another member of the primary care team or a community pharmacist either face-to-face in Medication Usage Reviews or even over the telephone<sup>(93)</sup>.

Although adherence can be improved, no specific intervention can be recommended for all patients and routine assessment of adherence (to recommended lifestyle changes and all recommended interventions), in a non-judgemental way, should be part of good clinical practice.

## Quality

Clinical quality encompasses all facets of good patient care. A high quality FLS service will be focussed upon the patient and the components of the service should act seamlessly and conveniently for the patient. The FLS will be equally accessible to all those who may benefit from it. The Service will be efficient in terms of timing of patient interactions that will be convenient to the patient while recognising effective and responsible use of NHS resources. A high quality FLS will integrate communication channels around and through the patient so that all healthcare professionals are working in concert to optimise patient outcomes. The patient will be managed holistically with a focus on long-term care and monitoring of therapies and interventions to ensure optimal clinical outcomes. These clinical quality service standards provide a framework for constructing a unified high quality national service for fracture prevention.

Prescriptive quantitative measures of performance against the quality standards have intentionally been omitted. The authoring group recognised that at the time of writing there was variability in the provision of FLSs nationally and that the emphasis on service development should be around establishing a baseline of performance and co-operative working between local commissioners and providers to iteratively and responsibly develop the FLS. The authoring group advocate using the quality standards and metrics to provide national benchmarking data to provide assurance of high quality services with equitable access for all across the health system.

## Recording data to evaluate performance

**STANDARD 8: Core clinical data from patients identified by the FLS will be recorded on a database. Regular audit and patient experience measures will be performed and the FLS will participate in any national audits undertaken.**

A database is a necessity for any FLS. Effective administration and data collection are paramount given the number of patients passing through an FLS each year. As well as reducing the administration burden within an FLS allowing more time for patient contact, efficient databases also store data in a form that can be used for audit purposes.

Important parameters to record in an FLS database include the hospital number and the patient's NHS number, date of birth, sex, presenting / current fracture and incidence of previous fractures since the age of 50 years. It must also document whether a DXA has been requested, the date of the DXA, and the patient's current DXA lowest T-score. Where calculated, fracture risk assessment scores (e.g. FRAX or QFracture) can also be recorded. Furthermore, treatment modalities following DXA and concordance with treatment after 4 months and 12 months must also be included.

Any data collection tool may be used as the basis of the database. Programmes such as Microsoft Excel or Access can be used to develop a bespoke database; open source solutions such as ELFIN (developed in Oxford) can be used, and commercial options are available. At the time of writing, the feasibility of a national database was being tested (see Falls and Fragility Fractures Audit Programme below) which would offer online data capture similar to the well-established National Hip Fracture Database (NHFD).



Whichever data collection tool is used, it will need to meet local data protection protocols and the input method needs to be consistent in order to generate reliable information that can be used to improve the FLS. If collected effectively, the data can show not only the age, type of fracture and T-scores of each patient, but may also be used to illustrate trends in fracture types at differing patient ages and highlight trends and effectiveness of the FLS. Some databases can also be used to generate GP and patient letters and provide reminders about DXA appointments.

### **Falls and Fragility Fractures Audit Programme**

The Falls and Fragility Fracture Audit Programme (FFFAP) is a national clinical audit run by the Royal College of Physicians. It is designed to audit the care that patients with fragility fractures and inpatient falls receive in hospital and to facilitate quality improvement initiatives.

As part of this programme, a national audit for all fragility fractures – known as the FLS Database (FLS-DB) – has been tested for feasibility and secured further funding for an initial two year roll out. The audit seeks to establish a web-based tool for data input as well as mechanisms for uploading data from any existing database being used.

The FLS-DB provides both a ready-made database for storage of a core dataset, site specific feedback to inform service development and national benchmarking. Through engagement in national audit, a greater understanding of secondary fracture prevention can be achieved and standards improved to ensure consistently high quality of care.

## Competencies

**STANDARD 9: The FLS team will have appropriate competencies in secondary fracture prevention and are supported to maintain relevant CPD.**

In order to provide safe and clinically effective care and management, it is recommended that all health practitioners within an FLS undertake relevant training in secondary fracture prevention. Various courses, conferences and meetings exist across the UK and beyond that provide evidence-based knowledge on osteoporosis. However, there has not been specific training to support Fracture Liaison practitioners in their role, or to induct them, other than that which is provided informally in-house. Further, no standards or competency statements have been established for Fracture Liaison practitioners to ensure high quality care.

Recognising this gap, the National Osteoporosis Society is developing an accredited online training programme for all Fracture Liaison practitioners, thus establishing a certificated competency standard at a foundation and an advanced level, which should be annually revalidated. This will be available from 2015.

Continuing Professional Development (CPD) refers to the process of recording, reviewing and reflecting on the skills, knowledge and experience gained both formally and informally through learning at work, beyond any initial training. All health professionals are responsible for their own CPD on an ongoing basis to ensure they are kept up-to-date with best practice in their field to deliver the highest quality of care for all their patients. Therefore, practitioners within the FLS team should maintain appropriate CPD through attendance at relevant conferences, courses and training events on an ongoing basis. They should be supported by their employers to undertake necessary activities.

## Peer review

Peer review of osteoporosis services allows a means of assessing clinical care against agreed standards. Peer review also addresses agendas of clinical governance, revalidation, and service development, with a view to facilitating all UK centres to develop high standard, quality assured levels of care for patients with osteoporosis and high fracture risk. Additional benefits of the peer review scheme include lifting morale of healthcare providers by ensuring that clinical teams' voices are heard and helping to shape the future delivery of the service. The primary aim of the peer review scheme, however, is to improve services for patients with osteoporosis and related fractures.

**STANDARD 10: The FLS should engage in a peer-review process of quality assurance.**

Peer review may be organised informally between sites with FLS. Peer review of osteoporosis services, including evaluation of FLSs where these are in place, is also offered by some professional bodies and the National Osteoporosis Society.

# Implementing an FLS for every health economy

Since its conception, FLS has been demonstrated to work in different settings – urban and rural, primary care and secondary care – across the UK, and indeed the world. By striving for universal FLS provision across the UK, we could prevent a quarter of future hip fractures. Quality of care will be standardised and equity of access to high quality care will be improved as well as generating systems savings.

This section will explore some of the practical considerations in establishing your FLS and meeting the standards described in this document.

## FLS models

A number of different approaches have been taken to define how an FLS might be set up. These models have been trialled in a number of centres across the world, allowing comparisons to be made of their effectiveness<sup>(94)</sup>.

These approaches can be summarised into the following four groupings:

**Type A** – These models of care identify patients following a fracture who are then fully assessed and treated as part of a co-ordinated package of care managed by a Fracture Liaison Co-ordinator (FLC). Type A models include prescribing drug therapies within the service.

**Type B** – These are similar to Type A with the exception that treatment must be initiated by the patients' primary care physician. An FLC is also pivotal to the success of this model of care.

**Type C** – These models of care are less intensive. Patients generally receive education about osteoporosis, the benefits of treatment and falls prevention along with lifestyle education. The patients' primary care physician is then alerted to the recent fracture and advised of the need for further investigation and treatment.

**Type D** – In these models, patients receive specific osteoporosis education only via letter, patient information sheet, video, telephone or in a face-to-face interaction. This model does not include any intervention or physician education.

Analysis of the available data shows that, in terms of numbers of patients being referred for DXA, numbers of patients being started on treatment and better longer-term treatment adherence, Type A and Type B models are more effective. Therefore, Type A or Type B FLS models are recommended for widespread adoption.

## Creating an FLS

Establishment of any new service requires time and dedication. Most successful services are driven by a clinical champion who persuades others of the need for the service, co-ordinates stakeholders and drives the service from concept to reality. Recognising the amount of work involved, the National Osteoporosis Society has developed an online FLS Improvement Toolkit which provides templates and resources to help locations who wish to start, or improve, their FLS. The Toolkit includes a service improvement guide which contains a description of the key steps in establishing an FLS. All resources are freely available at [www.training.nos.org.uk/Toolkit](http://www.training.nos.org.uk/Toolkit).

When setting up an FLS, there are a number of service components to be considered. The key components for any service are described in Table 9.

| Component  | Role / function  |
|--|--|
| Clinical champion  | Leadership and championing campaign to gain funding for the FLS  |
| Lead clinician   | Clinical supervision and higher-level decision-making<br>Management of patients who fall outside criteria covered by FLS protocols<br><br>(This may be the same person as Clinical Champion above)   |
| FLS Co-ordinators  | Effect the 5IQ approach – identification of patients with fractures, investigation (including fracture risk assessment with DXA), information sharing (including delivery of patient-centred education), intervention (where required) and integration (including liaison with services providing falls risk assessment (if not provided within the FLS itself) and exercise classes) and communication of integrated care plan with primary care physicians, and ensuring quality of service.<br><br>Staffing levels will vary depending on the expected number of fractures being reviewed by the FLS. However, single practitioner services are discouraged due to issues with continuity of service that arise during leave. |
| DXA and fracture risk assessment                           | Investigation by the FLS must include fracture risk assessment with access to DXA  |
| Admin and clerical support                                 | To make the requisite appointment(s) for investigation at a (potentially one-stop) clinic incorporating DXA. To distribute FLS reports to GPs  |
| Electronic medical record (EMR) and database               | All stages of the patients' FLS pathway from identification through investigation to intervention must be recorded in the EMR to facilitate generation of reports for the patients' GPs. The EMR may also be the communication hub with exercise classes or falls prevention services (where not integral to the FLS itself). The EMR database provides essential audit data to track outcomes from the FLS to inform further service development and improvement  |
| Access to a doctor-led clinic                              | 3–5% of patients processed by an FLS will need further evaluation at a doctor-led clinic (typically patients falling outside FLS management protocols or those with secondary causes of osteoporosis)  |
| Commitment to quality improvement methodology such as PDSA | It is unlikely that the first incarnation of an FLS will fully achieve the desired goals. Engagement in PDSA commits to service redesign and improvement until the optimal service model has been established  |

Table 9: Essential components of an FLS

## Exemplar services

FLSs have traditionally been based in secondary care but an alternative model has been developed in primary care. Regardless of the setting, it is recommended that all localities commission an FLS following evidence-based models either for acute-based services (e.g. Glasgow) or primary-care-based services (e.g. West Sussex). This section provides a description of services based in each of these settings.

### FLSs in secondary care

#### Glasgow, Scotland

##### Background

The Fracture Liaison Service was first conceived in Glasgow in 1999-2000 in response to clinical guidelines for the prevention and treatment of osteoporosis by the Royal College of Physicians. A number of options for post-fracture osteoporosis assessment were considered prior to the evaluation of FLS. These options included the development of a direct access DXA service for GPs and the setting up of an analogous service for direct referral for DXA from fracture clinics. Neither of these options effectively captured the post-fracture population. The relative lack of success of these options was the driver behind the setting up of the world's first FLS. The Health Board and clinicians agreed to set up a city-wide multi-disciplinary strategy group. This group effectively played a commissioning role (although commissioning had not been described in health care at that point). This group helped to support development of an effective and sustainable solution to the management gap that had been highlighted.

By 2001, the city's three hospitals with an orthopaedic/trauma service had full access to the FLS, giving the entire population (of men and women over age 50 years) access to post-fracture investigations and interventions.

##### Current practice

The service offers assessment to all fracture patients over the age of 50, with the only exceptions made being fractures of the skull and face, or those with obvious major trauma such as road traffic accidents. Patients are generally offered a DXA scan. Exceptions are made in hip fracture patients over the age of 75 years and in patients with two or more vertebral fractures where anti-resorptive therapy will generally be initiated straight away.

##### Outcomes and impact

The FLS in Glasgow has ensured that treatment recommendations reflect the current evidence base. Furthermore, evaluation of long-term data gathered by the service showed a reduction in hip fracture rates of around 7% in comparison to hip fracture rates in NHS England which increased over the same period<sup>(45)</sup>. A further analysis of the Glasgow dataset has shown how FLS is a cost effective service and how FLS can even be cost saving.

### FLSs in primary care

The original models for Fracture Liaison Services were secondary-care based; however, an alternative model has been developed in primary care. There are some advantages to this. The object of a community-based FLS is to provide care for the majority, releasing secondary care time for complex patients needing consultant input; care can be offered conveniently, closer to the patient's home, which is particularly advantageous to those who are frail and elderly; follow up to ensure long term management can be offered readily; and the service can easily be expanded to look for those who may be at risk of osteoporosis who have had a fracture in the past. Primary care-based FLS may also be better placed to capture people who have suffered vertebral fractures, which often do not present in secondary care settings.

## Crawley, West Sussex, England

### Background

The West Sussex service is based in Crawley, a town of approximately 120,000 population, and was established in 2009. The Crawley service is led by a full-time Specialist Nurse Prescriber with clinical support from a GP with a special interest in osteoporosis. A part-time administrator supports the service for 15 hours a week.

### Current Practice

The Specialist Nurse carries out a case finding strategy using monthly reports from X-ray and reports from the local Health Care Trust, together with requests from GPs to identify patients who have had a fragility fracture. Patients are initially contacted by telephone to arrange face-to-face consultations based in their local GP practice. Clinics are scheduled for surgeries on a monthly basis.

By using the patient's primary care health record, the Specialist Nurse can access recent blood test results ensuring that additional tests are only carried out when necessary. Their record may also reveal important information about the causes of the osteoporosis (e.g. steroids) or the drugs that may have precipitated a fall.

Where needed, a therapeutic agent is initiated (e.g. bisphosphonate or calcium/vitamin D) and reviewed at a second visit where side effects are assessed, treatment modified, additional medication is co-prescribed and important information about the correct way to take treatments can be reinforced to improve treatment persistence and adherence.

Review appointments can be by telephone or face to face and home visits can be arranged if necessary. Appointments and follow-up can also be made with patients' carers, who will often administer medications.

The primary care-based service is well placed to respond to non-admitted fractures and vertebral fractures identified opportunistically on X-rays performed for other reasons. They also have an advantage in providing an enhanced service which is able to look for previous fractures in patient records and carry out targeted primary prevention in high risk patients.

### Impact and outcomes

Data from the service show that hip fractures in the Crawley Clinical Commissioning Group (CCG) have declined steadily over the last three years while these have increased in line with national expectations for an adjacent CCG. The number of hip fractures admitted from care homes in Crawley has also decreased from 16% in 2012 to 8% in 2013, compared to a national average of 20%.

| FLS   | Glasgow, Scotland   | Crawley, West Sussex, England  |
|---|---|--|
| <b>Setting</b>  | NHS – Secondary care  | NHS – Primary care   |
| <b>Population served by FLS</b>   | 1.4 million – served by network of five FLS centres   | 116,000  |
| <b>When established</b>   | 1999  | 2009   |
| <b>Specialty of ‘lead clinician’</b>  | 3 Endocrinologists and 1 Rheumatologist   | GP   |
| <b>Number of FLS Co-ordinators</b>  | 8.5 whole time equivalent (WTE) Osteoporosis Nurse Specialists  | 1 WTE Osteoporosis Nurse Specialist  |
| <b>Number of new fractures (clinical fractures and newly reported radiological vertebral fractures) identified by service per year</b>                                  | 10,000  | 310  |
| <b>Which patients are eligible?</b>   | Women and men aged 50 years and over  | Women and men aged 50 years and over   |
| <b>Which fractures are eligible?</b>  | Low-trauma fractures<br>Any site – excluding skull and facial fractures   | Low-trauma fractures<br>Any site – excluding skull, facial, metacarpal and phalangeal fractures  |
| <b>Identification of patients with fractures who are managed as inpatients</b>  | Co-ordinator identifies inpatients with fractures on Orthopaedic / Trauma wards and also attends morning Orthopaedic team meeting<br>Orthopaedic database (Bluespier) also supports case-finding<br>Women age 75+ years with hip fracture are treated without prior DXA | Discharge reports from inpatients with fractures are copied to the FLS. Monthly meetings are held with the Bone Health Specialist, Elderly Care Consultant, Community Geriatrician, Orthogeriatrician and Fracture Clinic Sister |
| <b>Identification of patients with fractures who are managed as outpatients</b>   | Fracture clinic visits by Co-ordinator<br>Co-ordinator also obtains fracture clinic patient lists   | Systematic MIQUEST searches of practice records, CCG data, secondary care reports e.g. DXA, X-ray and Orthogeriatricians   |
| <b>Identification of patients with Radiology reports featuring vertebral fractures</b>  | All Radiology reports reviewed by ONS   | Radiology reports to practice are reviewed   |
| <b>% target patients with new fractures identified</b>  | ~100%   | ~100%  |
| <b>Does FLS assess patients with previous fractures?</b>  | Yes   | Yes  |
| <b>If yes, who identifies them and how do they access the FLS for investigation?</b><br><b>How many patients with previous fractures are assessed by FLS each year?</b> | Identified and referred by GPs<br>1000  | Co-ordinator – using Miquet search   |
| <b>Investigation</b>  |   |  |
| <b>Who arranges investigation?</b>  | Co-ordinator  | Co-ordinator   |
| <b>Who undertakes investigation of patients with fractures?</b>   | Co-ordinator  | Co-ordinator   |
| <b>Which investigations are included?</b>   | DXA + IVA (on site)<br>FRAX including DXA<br>Laboratory blood tests<br>One-stop clinic (nurse-led)  | DXA (located at another site)<br>FRAX<br>Blood tests   |
| <b>% workload of patients with new fractures identified that undergoes subsequent investigation</b>   | 80% of entire presenting-fracture cohort  | All identified fractures are investigated  |

| FLS   | Glasgow, Scotland   | Crawley, West Sussex, England   |
|---|---|---|
| Intervention  |   |   |
| <b>On basis of investigations performed by FLS, who decides what intervention is required?</b>  | Co-ordinator using FLS protocols at one-stop clinic<br>Input from lead clinician, as required   | Co-ordinator with input from GP when required   |
| <b>Approx. % patients identified with fracture who, after investigation, receive active treatment e.g. bisphosphonates, PTH, denosumab etc. with or without calcium and vitamin D supplementation</b> | 36%   | 95%   |
| <b>Do fracture patients have access to falls interventions?</b>   | Yes<br>> 65-year-olds by referral   | Yes<br>By referral  |
| <b>What opportunities for patient education are available through FLS?</b>  | At identification<br>At investigation and intervention (one-to-one) by Co-ordinator and 6 months later through group education sessions (in which NOS participates) (eight sessions per year)   | One-to-one education by Co-ordinator. Also provision of education to carers and care-home staff                             |
| <b>Database / EMR used to record the clinical workload managed by FLS</b>   | GISMO   | GP database<br>Dedicated database by Business Intelligence used to collect Key Performance Indicators and required FLS data |
| <b>Who issues first prescription for drug treatment where that is required?</b>   | GP  | Co-ordinator  |
| <b>Who issues second and subsequent prescriptions for drug treatment?</b>   | GP  | GP  |
| <b>Whose responsibility is adherence / compliance monitoring?</b>   | GP  | Co-ordinator  |
| <b>Key references including service model descriptions for local FLS</b>  | McLellan AR et al. The fracture liaison service: success of a program for the evaluation and management of patients with osteoporotic fracture. <i>Osteoporosis Int</i> 2003; 14:1028-1034.<br>Fraser M, McLellan AR. Osteoporosis: establishing a fracture liaison service. <i>Professional Nurse</i> 2004; 19:286-290.<br>McLellan AR and Fraser M. Fracture Liaison Services. Ch 14 In: <i>Managing Osteoporosis</i> Eds: Lanham-New S, O'Neill T, Morris R, Skelton D, Sutcliffe A. Clinical Publishing, London 2007. |   |
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| <b>Role of medical staff in this model</b>  | Lead clinician and 'champion'<br>Supervision, support and advice for Co-ordinator<br>Sees ~3% of workload at endocrine clinic to progress investigation for secondary causes or to follow-up clinical or laboratory abnormalities   |   |



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## End notes

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## About us

The National Osteoporosis Society is the only UK-wide charity dedicated to improving the diagnosis, prevention and treatment of osteoporosis. The charity works to:

Influence government and campaign to improve and maintain essential services.

Provide a range of information resources including leaflets on all aspects of osteoporosis for you and your patients, some of which can be ordered in quantities for you to use in healthcare settings.

Provide a helpline staffed by nurses with specialist knowledge of osteoporosis and bone health.

Raise money to fund important research.

Host a major UK scientific conference on osteoporosis for health professionals

## Professional membership

Professional membership of the National Osteoporosis Society can make your job easier if you support people with osteoporosis or fractures, or are involved in research connected with osteoporosis.

Your professional membership will mean you can stay up-to-date with new treatments, care and the latest news on research. It means you'll have a deeper understanding of the condition.

You can also feel proud to be part of an organisation working hard to help those affected by osteoporosis.

To find out more about becoming a professional member, call our membership department on

01761 473287 or visit us at [www.nos.org.uk/professionals](http://www.nos.org.uk/professionals)

 **0845 130 3076** (General Enquiries)

 **0845 450 0230** (Helpline)

 **[www.nos.org.uk](http://www.nos.org.uk)**

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